

REMARKS

Claims 1-29 are pending in the present application. Claims 1, 3, 5, 7, 12, 14, 21, and 27 are amended. Claims 1, 7, 14, 21, and 27 are amended to address Examiner's concern regarding the use of the word "connect" which was deemed unnecessary in the telephone conference, discussed below. Claims 3 and 5 are amended to correct their terminology so they properly depend. Reconsideration of the claims is respectfully requested.

I. Examiner Interview of June 5, 2003

Applicant respectfully directs Examiner Nguyen to the telephone interview conducted on June 5, 2003. In this interview, several items were discussed, as summarized below.

With respect to Claims 7 and 9, it was agreed that the term "electrode" is supported by the specification. Examiner indicated he would withdraw the rejection of Claims 7 and 9 under 35 USC 112 first paragraph.

With respect to Claims 1-29, rejected under 35 USC 112 second paragraph, Examiner indicated that the rejections of Claims 14, 21, and 27 would be withdrawn because these claims particularly point out and distinctly claim the invention with respect to the structural relationship between the outcoupling aperture and the gain region. It is noted that Claims 1, 7, 14, 21, and 27 are amended to address Examiner's remaining rejections under this section, as described below.

Claims 1, 7, 14, 21, and 27 are amended to omit use of the word "connect", which Examiner deemed unnecessary.

II. 35 U.S.C. § 112, First Paragraph

The Examiner has objected to the specification under 35 U.S.C. § 112, first paragraph, as failing to adequately teach how to make and/or use the invention in claims 7 and 9. Additionally, the examiner rejected the claims under the same reasons. This rejection is respectfully traversed.

Applicant respectfully refers Examiner to the specification at page 27, which states,

Figure 13 shows a DBR laser according to an embodiment of the present innovations. The gain region 1300 has multiple parts in this example, one on either side of an outcoupling grating. One part of the gain region is further split into two parts, a larger 1302 and a smaller 1304 section. The smaller part, which can be used to more sensitively adjust the current supplied to the gain region, is used for several purposes. It can be used as a fine tuning device for the wavelength of the light in the cavity. By increasing or decreasing the current, the wavelength can be slightly tuned to some degree. The smaller contact can also be used to modulate the signal generated in the cavity. By varying the supplied current over time, the intensity of the emitted light can be varied. This can be used to modulate the signal by adjusting the current over time to alter the intensity of light, and thus embed a signal in the emitted light. The smaller contact is the preferred one to use for such modulation, since it will allow faster modulation (due to lower capacitance, etc.).

This passage refers to contacts, not electrodes. However, an electrode and a contact are synonymous as being an electrical conductor through which an electric current passes. It is respectfully submitted that one of ordinary skill in the art, upon reading the above passage about electrical contacts, would not be confused as to the meaning of "electrode" in Claims 7 and 9. Hence, Applicant respectfully submits that the current specification complies with 35 USC 112, first paragraph, by including a written description of the invention in full, clear, and concise terms as to enable any person skilled in the art to make and use the invention.

Finally, Examiner Nguyen is respectfully directed to the telephone conversation of June 5, 2003, wherein it was agreed that the rejection under this section would be withdrawn.

Therefore, the objection of the specification under 35 U.S.C. § 112, first paragraph has been overcome.

III. 35 U.S.C. § 112, Second Paragraph

The examiner has rejected claims 1-29 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter, which applicants regard as the invention. This rejection is respectfully traversed.

The rejection of all claims under this section is based on the rejection of the independent claims 1, 14, 21, and 27. It is noted that Examiner agreed (in the aforementioned telephone interview) these claims fulfill the statutory requirement with respect to the structural relationship between the outcoupling aperture and the gain region. Applicant has also amended these claims to omit the word "connected," which Examiner indicated would fulfill the requirements of 35 USC 112.

Claims 13 and 26 are rejected for failing to define what the other optical elements are. Applicant respectfully submits that this claim is not indefinite. Failure to describe what the other optical elements does not render this claim indefinite. One of ordinary skill in the art will understand what this term means. Though this limitation may include many different optical elements, "optical elements" are understood by those of ordinary skill in the art. This rejection is therefore respectfully traversed.

Hence, based on the telephone interview, Applicant believes this rejection has been fully overcome.

IV. 35 U.S.C. § 102, Anticipation

The Examiner has rejected claims 1-4, 10, 14-16, 19-20, 22, 24, and 27-29 under 35 U.S.C. § 102 as being anticipated by Khalfin et al., (hereinafter Khalfin). This rejection is respectfully traversed.

Re Claim 1: Claim 1 has been amended to more clearly reflect the claimed invention. It reads:

1. A surface emitting semiconducting laser device, comprising:
a waveguide having separate first order reflector gratings at both ends of said waveguide on a first surface of the laser device;
an outcoupling location positioned between said gratings on said waveguide, to couple light out of said waveguide through said first surface of the laser device.

[Emphasis added.]

It is respectfully submitted that the cited references do not show the above emphasized limitations. Namely, the cited reference does not show a surface emitting laser wherein the outcoupling location is (1) between the reflector gratings, and (2) on the same surface of the device as the reflector gratings.

The cited reference, Khalfin, does not show such a surface emitting laser. The laser of Khalfin (i.e., the master oscillator) couples light from the side of the device into the amplifier section. The side of the device through which light is coupled is not the same surface of the device as that of the reflector gratings. For example, in FIG. 7 of Khalfin, the reflector gratings 701a and 701b are shown on the top surface of the master oscillator, while the light is coupled out through one side of the master oscillator, the outcoupling surface being at 90 degrees from the surface of the reflector gratings.

This distinction shows that the system of Khalfin is directed to a master oscillator that laterally couples light into an adjoining amplifier section rather than emitting light through the side of the device that includes the reflector gratings.

Therefore, the rejection of Claim 1 is believed overcome.

Claim 14 is also rejected under the same rationale and the same art. Claim 14 is reproduced below for discussion:

14. A semiconductor laser device, comprising:
a cavity having reflectors at either end and an outcoupling aperture to outcouple light from said cavity;
a gain region of said cavity located between said reflectors, said gain region having a first portion on one side of said outcoupling aperture and a second portion on the opposite side of said outcoupling aperture.

[Emphasis added.]

It is respectfully submitted that Khalfin does not show the above emphasized limitations, namely, the gain region as described above. No description of the gain region

is found in the cited parts of Khalfin, and Applicant can find no other description of a gain region as claimed in the Khalfin reference. If Applicant has overlooked a relevant teaching, it is respectfully requested that such teaching be pointed out with particularity. It is therefore respectfully submitted that Khalfin does not teach the claimed limitation of, "a gain region of said cavity located between said reflectors, said gain region having a first portion on one side of said outcoupling aperture and a second portion on the opposite side of said outcoupling aperture," as claimed in Claim 14.

It is noted that the gain region of Claim 14 must be located between the reflectors, and also have a portion on either side of the outcoupling aperture, as claimed. If the outcoupling aperture is taught by grating 703 of Khalfin, as Examiner specifies in the Office Action, then Applicant respectfully submits that Khalfin cannot implement a gain region between the reflectors 701a and 701b because the outcoupling grating 703 of Khalfin is depicted as filling the entire space between reflectors 701a and 701b.

Hence, it is respectfully submitted that Claim 14 has been distinguished from the cited reference.

Claim 27 is also rejected under Khalfin, and Applicant respectfully submits that Claim 27 is distinguished in the same way as Claim 14. Particularly, Khalfin does not appear to teach a gain region as claimed. If Applicant has overlooked a relevant teaching, it is respectfully submitted that such teaching be pointed out with particularity.

Additionally, the claims which depend from Claims 1, 14, and 27 claim other additional combinations of features not suggested by the reference. Consequently, it is respectfully urged that the rejection of these claims have been overcome.

Therefore, the rejection of claims 1-4, 10, 14-16, 19-20, 22, 24, and 27-29 under 35 U.S.C. § 102 has been overcome.

V. 35 U.S.C. § 103, Obviousness

The examiner has rejected claims 7-9, 13, and 26 under 35 U.S.C. § 103 as being unpatentable over Khalfin in view of Itagaki. This rejection is respectfully traversed.

With respect to Claim 7, the Examiner cites Khalfin, stating that,

Khalfin discloses all limitations of the claim 1 above except for the first and second set of electrodes. Itagaki teaches in FIG. 2 a first and second set of electrodes 20. For the benefit of pumping a gain region, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine Khalfin with a first and second set of electrodes 20 as taught by Itagaki.

However, FIG. 2 of Itagaki does not show one laser diode, it shows two laser diodes 110a and 110f laid end to end, as depicted in FIG. 1 of Itagaki. Note that Itagaki states at col. 6, lines 40-41:

FIGS. 2 and 3 are sectional views for explaining the operation of the surface emitting LD array shown in FIG. 1.

FIG. 1 of Itagaki shows a set of lasers arranged in a ring, with lasers 110a and 110f depicted as separate laser diodes.

Further, the text of Itagaki also portrays lasers 110a and 110f as separate, at col. 8, lines 55-60:

When respective LDs 110a and 110f included in the surface-emitting LD array 100 oscillate upon the injectio of currents of the same magnitude, as shown in FIG. 2, laser light beams 23a and 23b emitted from the secondary diffraction gratings 16 of the surface emitting LDs 110a and 110f have the same wavelength and the same phase.

Since the two lasers are separate, and since each laser individually only shows one single electrode 20, it is respectfully submitted that the combination of Khalfin and Itagaki does not teach the claimed limitations of at least Claim 7.

Examiner rejects Claim 21 over the combination of Khalfin and Nishiwaki. It is respectfully submitted that Claim 21 is distinguished from the cited Khalfin reference in the same manner as Claim 1, as described above. It is noted that Claim 21 is amended to more clearly describe the invention, as shown:

21. A surface emitting semiconductor laser system, comprising:
a cavity having reflectors at either end and an outcoupling aperture ~~connected~~ to outcouple light from said cavity through a first surface of the laser system, said outcoupling aperture located between said reflectors on the first surface;
a gain region of said cavity located between said reflectors;
a reflective layer positioned on said outcoupling aperture.

As argued above, it is respectfully submitted that Khalfin does not show these limitations.

Therefore, the rejection of all claims is believed overcome.


VI. Conclusion

It is respectfully urged that the subject application is patentable over the cited references and is now in condition for allowance.

The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

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Respectfully submitted,



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